ORIGINAL

LATHAM & WATCHINS

ATTORNEYS AT LAW
1001 PENNSYLVANIA AVE., N.W., SUITE 1300
WASHINGTON, D.C. 20004-2505
TELEPHONE (202) 637-2200
FAX (202) 637-2201
TLX 590775
ELN 62793269

PAUL R. WATKINS (1899-1973)
DANA LATHAM (1898-1974)

CHICAGO OFFICE
SEARS TOWER, SUITE 5800
CHICAGO, ILLINOIS 60606
TELEPHONE (312) 876-7700
FAX (312) 993-9767

LONDON OFFICE
ONE ANGEL COURT
LONDON EC2R 7HJ ENGLAND
TELEPHONE + 44-71-374 4444
FAX + 44-71-374 4460

LOS ANGELES OFFICE
633 WEST FIFTH STREET, SUITE 4000
LOS ANGELES, CALIFORNIA 90071-2007
TELEPHONE (213) 485-1234
FAX (213) 891-8763

MOSCOW OFFICE
113/1 LENINSKY PROSPECT, SUITE C200
MOSCOW 117198 RUSSIA
TELEPHONE + 7-503 956-5555
FAX + 7-503 956-5556

NEW JERSEY OFFICE
ONE NEWARK CENTER
NEWARK, NEW JERSEY 07101-3174
TELEPHONE (201) 639-1234
FAX (201) 639-7298

NEW YORK OFFICE
885 THIRD AVENUE, SUITE 1000
NEW YORK, NEW YORK 10022-4802
TELEPHONE (212) 906-1200
FAX (212) 751-4864

ORANGE COUNTY OFFICE
[illegible] CENTER DRIVE, SUITE 2000
COSTA MESA, CALIFORNIA 92626-1925
TELEPHONE (714) 540-1235
FAX (714) 755-8290

SAN DIEGO OFFICE
701 "B" STREET, SUITE 2100
SAN DIEGO, CALIFORNIA 92101-8197
TELEPHONE (619) 236-1234
FAX (619) 696-7419

SAN FRANCISCO OFFICE
505 MONTGOMERY STREET, SUITE 1900
SAN FRANCISCO, CALIFORNIA 94111-2562
TELEPHONE (415) 391-0600
FAX (415) 395-8095

RECEIVED
MAR - 4 1996
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

March 4, 1996

DOCKET FILE COPY ORIGINAL

By Messenger

William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, NW
Washington, DC 20554

EX PARTE OR LATE FILED

Re: CC Docket No. 92-297, RM-7872, RM-7722
Ex Parte Presentation

Dear Mr. Caton:

On March 1, 1996, the enclosed written materials were delivered on behalf of Hughes Communications Galaxy, Inc. to Mr. Scott Blake Harris, Ms. Michele Farquhar and the other Commission representatives listed thereon.

An original and two copies of this letter are enclosed.

Respectfully submitted,

John P. Janka

Enclosures

No. of Copies rec'd 0+2
List ABCDE

RECEIVED
MAR - 4 1996
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

March 1, 1996

Via Messenger

Scott Blake Harris
Chief, International Bureau
Federal Communications Commission
2000 M Street, N.W., Room 830
Washington, D.C. 20554

Michele Farquhar
Chief, Wireless Telecommunications Bureau
Federal Communications Commission
2025 M Street, N.W., Room 5002
Washington, D.C. 20554

Re: CC Docket 92-297
28 GHz Spectrum Band Plans

Dear Mr. Harris and Ms. Farquhar:

Hughes Communications Galaxy, Inc. is writing this letter to submit its analysis of whether any additional costs would be imposed on LMDS subscriber boxes under the Option 5 band plan, as compared with other band plans currently under consideration.

In short, there is no cost imposed on LMDS subscriber boxes under Option 5 that is not already present under any of the other band plans. Moreover, the costs for LMDS to use non-contiguous spectrum are the same as the costs that the GSO satellites will bear to use non-contiguous spectrum.

Under each of the seven band plans described in the materials distributed at the 28 GHz status conference on February 16, 1996, LMDS would be allocated 950 to 1000 MHz of spectrum on a non-contiguous basis. In other words, LMDS would be allocated 1000 MHz in two or more segments that are separated by intervening allotments to other services. In no instance would the total range over which LMDS bandwidth is spread be less than 1.2 GHz. LMDS claims to require access to a total of 1000 MHz of spectrum for "hub-to-subscriber" transmissions in order to be competitive with cable and fiber.

Texas Instruments (TI) claims in its letter of February 28, 1996 that Option 5 is unacceptable primarily because the 1000 MHz of LMDS spectrum would be spread over a range in excess of 1,000 MHz and that use of a frequency range in excess of 1,000 MHz requires modifications to existing subscriber boxes that have been designed for cable or DBS service. TI alleges that this would require that entirely new subscriber boxes be designed for LMDS, which would place LMDS at a "serious, perhaps fatal" competitive disadvantage to other multichannel video services.

TI's unsubstantiated assertions regarding subscriber box costs under Option 5 are simply wrong. Moreover, they are inconsistent with LMDS support for other band plans that have been proposed. Under TI's own logic, not one of the seven band plans being considered by the Commission arguably could accommodate the use of existing subscriber boxes for a 1000 MHz LMDS architecture. Under each of Option 1, 2, 2A, 3, 4 and 5, the total frequency range for the LMDS allocation exceeds the 1,000 MHz range that TI claims cannot be exceeded without imposing undue cost penalties. In fact, under Options 3 and 4, which various LMDS proponents have endorsed, the total LMDS frequency range is 1.875 and 1.825 GHz, respectively. Thus under any of these plans, LMDS faces the same frequency range challenges as it would face under Option 5. Only Option 2B, with a total LMDS frequency range of 1.2 GHz, provides LMDS a frequency range that is covered by today's off-the-shelf subscriber equipment.

Thus, an LMDS operator will be required to modify existing off-the-shelf subscriber equipment if it is to use the entire 1.0 GHz that LMDS claims it needs to compete with cable and fiber.

LMDS is not alone in having to make these types of design modifications to use off-the-shelf equipment. These are the same types of modifications that GSO FSS satellite operators will be required to make in order to utilize the 1.0 GHz of non-contiguous spectrum that the Commission has proposed to retain for the GSO FSS. Attached are specification sheets from COMSTREAM that describe a standard, off-the-shelf, DVB compatible tuner/demodulator that can tune over a 1.2 GHz range. Comstream provides tuners for DIRECTV subscriber boxes and complete subscriber boxes for other DBS providers.

Since the tuning span for GSO FSS subscribers would range from 1.8 GHz (under Option 5) to 1.65 GHz (under all other Options), GSO operators will have to expand the tuning range of existing equipment in order to build their mass-market, low cost subscriber boxes. Thus, the "pain" that LMDS would incur under any of these band plans is essentially the same as the "pain" that the GSO would bear from a non-contiguous spectrum

allocation. Only Option 2B provides LMDS with the possibility of using off-the-shelf subscriber equipment, since the total tuning range would not exceed 1.2 GHz.

Based on Hughes's experience in developing subscriber boxes for DIRECTV and for Spaceway, we are able to estimate the costs involved in modifying existing DBS subscriber boxes to increase the frequency range to 2.0-2.5 GHz so that they would be suitable for use by either LMDS or GSO FSS. The required modification affects only the tuner, which currently has a manufacturing cost of approximately $3-5 per unit for a DBS subscriber box.

> We project the one-time, non-recurring development cost to modify the range of an existing DBS tuner to cover a range of 2.0-2.5 GHz to be only $50,000-150,000.
>
> We estimate the initial production cost (500,000 units) per extended range tuner (2.0-2.5 GHz) at no more than $10-20 per unit, with that cost falling to $5-10 per unit as the production numbers exceed 1 million units.

The ultimate cost impact of redesigning these tuners for LMDS implementation is inconsequential, particularly considering that DIRECTV reached the 1 million subscriber level in about one year. Moreover, tuners with this type of a frequency range will be required to be designed and built for many of the GSO FSS satellite systems now proposed at the Commission, including the estimated 5 million subscribers that Hughes's Galaxy/Spaceway can serve. Hughes is currently designing the subscriber box for its system, which has a planned service commencement date of 1998. This additional demand for tuners will increase the market size and lead to further economies of scale and price reductions in the manufacture of wide band (2.0-2.5 GHz) tuners.

Finally, Hughes is compelled to respond to a number of other inaccuracies in TI's recent letter.

(1) Hughes has clearly explained in the record the basis for the 1000 MHz spectrum requirement for the GSO FSS, and Galaxy/Spaceway in particular, and will not repeat it here.

(2) TI is wrong when it asserts that the GSO FSS requires 1000 MHz instead of 875 MHz, or 925 MHz, in order to avoid mutual exclusivity. Access to 1000 MHz simply is a capacity and system viability issue. Mutual exclusivity among GSO FSS operators is achieved by the availability of 180 orbital

locations around the world where GSO satellites can operate, and compete, without interfering with one another.

(3) GSO satellite operators have the same incentive as LMDS to have this proceeding resolved promptly. GSO operators face competition in the U.S. from a number of foreign countries, such as India, Luxembourg, Great Britain, Canada and Mexico, who have filed at the ITU for orbital locations that are well suited for U.S. service. U.S. systems cannot afford to lose the race to the market by having those systems begin service here first.

In sum, in the case of a 1000 MHz LMDS architecture, there is no significant cost impact under Option 5 over that which is present under any other current band plan. Under any of Option 1, 2, 2A, 3, 4 or 5, an 1000 MHz LMDS architecture will need to modify existing DBS/BSS hardware to account for the use of non-contiguous spectrum. This is the same cost as the GSO FSS will bear to use the non-contiguous spectrum that the Commission has proposed for the GSO FSS. Under Option 2B, LMDS actually could use existing off-the-shelf equipment because the tuning range would be only 1.2 GHz.

As wide-band tuners become common with the roll out of LMDS and 28 GHz satellite systems, we expect the cost differential of the required subscriber equipment modification to be $2-5 per unit and therefore inconsequential for all parties.

We encourage the Commission to elicit any additional information it may need in order to dispel TI's unfounded assertions.

Sincerely yours,

Edward J. Fitzpatrick
Vice President

cc: Chairman Reed E. Hundt
Commissioner James H. Quello
Commissioner Andrew C. Barrett
Commissioner Susan Ness
Commissioner Rachelle Chong
Mr. Rudolfo Baca
Ms. Lauren Belvin
Mr. Brian Carter
Ms. Jackie Chorney
Ms. Jennifer Gilsenan
Mr. Donald Gips
Ms. Giselle Gomez
Mr. Robert James
Mr. Karl Kensinger
Mr. Blair Levin
Ms. Susan Magnotti
Ms. Jane Mago
Dr. Michael Marcus
Ms. Mary McManus
Mr. Harry Ng
Dr. Robert Pepper
Dr. Gregory Rosston
Mr. David Sidall
Ms. Lisa Smith
Ms. Suzanne Toller
Mr. Thomas Tycz
Ms. Jennifer Warren
Mr. David Wye

ComStream Digital Satellite and Cable TV Set-Top Receivers

Highlights

Integrated Receiver Decoder (IRD) for receiving compressed MPEG-2 video signals

Compliant with European Digital Video Broadcasting (DVB) standards

Highly manufacturable IRD platform with robust, high-performance interchangeable satellite or cable front ends

Open architecture software design for future interactive applications

Designed to accept Application Program Interface (API) real-time, multitasking operating systems

Modular, flexible hardware/software platform tailoring to specific user interface requirements such as:

- Conditional access
- Program guide
- Human ergonomic factors

Experienced high-volume manufacturer of demodulation front-end subsystems and set-top receivers

Packaged in one of the most compact, low-profile enclosures available

Overview

The ComStream Digital Satellite and Cable TV Receivers offer access to a wide variety of high-quality DVB direct-to-home or cable video and audio entertainment in compact, cost-competitive units. An open architecture design allows integration and development of future interactive and other applications into the receivers. ComStream's modular design accommodates different user interface requirements such as conditional access and program guides.

The ComStream Digital Satellite and Cable TV Receivers are packaged in a clean, compact enclosure that has a smaller profile and foot print compared to many other set-top receivers. Utilizing ComStream designed and manufactured high-performance custom integrated circuits (ICs), the receiver's rugged hardware is specifically designed for the demands of hostile in-home consumer environments.

ComStream is the leader in designing and manufacturing high-volume demodulator front-end subsystems and digital set-top receivers with on-time delivery of over 1.5 million demodulator subsystems. ComStream's capability positions you to deliver the next generation of digital home entertainment.

COMSTREAM.
A Spar Company

ComStream Digital Satellite and Cable TV Set-Top Receivers

Summary of Specifications

- DVB compliant
- Input frequency range: Satellite 950 to 2150 MHz; Cable 47 to 860 MHz
- Symbol Rate: Satellite 18 to 28 Msps; Cable 1.5 to 7 Msps
- Deinterleaving: DVB Convolutional, I=12
- Rapid acquisition time from channel change: <100 msec
- Low threshold operation

- MPEG-2 (ML/MP)
- OSD with graphics overlay
- Programmable resolution including 720x576
- PAL and NTSC models
- 16:9 and 4:3 display aspect ratios with 16:9 to 4:3 conversion (pan and scan)

- MPEG layers I and II
- Sampling rates 32, 44.1, and 48 kHz
- Data rates 32 to 384 kbps
- Stereo, joint stereo, dual mono, or mono
- 16-bit channel CD-quality sound

- SCART connectors
- S-VHS out
- Composite Video out (one or more RCA jacks)
- Stereo out (two or more RCA jacks)
- High-speed data out
- Low-speed data out
- Telephone jack
- UHF in for bypass
- RF out (channel 3/4 or UHF)
- Front panel LEDs
- Smart card socket
- Front panel switches
- Remote control receiver

- Height:(cm/in) 6.5/2.6
- Width: (cm/in) 35.5/14.2
- Depth: (cm/in) 21.5/8.6
- Weight: (kg/lbs) 2.25/5
- Input Power: 110 to 240 VAC, 50 to 60 Hz
- Power Consumption: 30 watts (max)

- U.S.A., Canada, Latin America, China, Asia-Pacific: 10180 Barnes Canyon Road, San Diego, California 92121 Tel:(619)458-1800 Fax:(619)657-5404
- Europe, Middle East, Africa: Ranger House, Walnut Tree Close, Guildford, Surrey GU1 4UX UK Tel:(44)1483 440 933 Fax:(44)1483 440 676

Specifications subject to change without notice. All trademarks acknowledged.
© ComStream Corporation 1995. All rights reserved.

ComStream.
A Spar Company

MK 0096 8-95

CDTV DMD-SUB-SE
European Digital PSK
Satellite Set-Top Demodulation Front-End Subsystem

The ComStream CDTV DMD-SUB-SE Digital Satellite Transmission Subsystem provides the industry's first cost-effective front-end solution for volume satellite set-top box applications according to DVB specifications. The CDTV DMD-SUB-SE is designed with the ComStream CDTV PSK-E, CDTV RS-E and CDTV VTR-E series of components. The entire subsystem minimizes total system cost in a satellite set-top box.

The CDTV DMD-SUB-E performs the functions to receive a high speed link of digital video, audio, voice, data and analog video channels, mixed within the band of digital satellite TV channels, and supports EBU/DVB specifications. The tuner module performs down-conversion of input analog signals and provides baseband outputs for input directly to A/D conversion for digital channels. The tuner also provides baseband demodulated signals for Analog TV channels.

The CDTV PSK-E demodulation IC performs demodulation for direct input to the CDTV VTR-E Viterbi FEC decoder. The Viterbi decoder corrects for channel losses and provides inputs directly to the CDTV RS-E Reed-Solomon FEC decoder. The subassembly outputs an error-corrected composite digital bitstream for demultiplexing, synchronization and video/audio decoding with a guaranteed maximum throughput delay <2 msec.

Product Features:

- Complete PCB Subassembly for a Satellite Transmission Subsystem including Tuner, IF Conversion, A/D, BPSK & QPSK Demodulation and FEC Functions
- EBU/DVB Compatible
- Supports Frequency Ranges from 950-2050 MHz (by µP Control)
- FM Demodulation of Analog TV signals
- Supports Variable Symbol Rates from 18 to 28 MSymbols/s
- Concatenated FEC Decoding:
  - Viterbi: R = 1/2, 2/3, 3/4, 5/6, 7/8
  - Deinterleaving (Forney): I=12
  - Reed-Solomon (204,188) (MPEG II packets)
  - Descrambling: IESS-309
- Channel Error-Rate and SNR Monitoring Available through µP Port
- MPEG-2 or Clear Channel Compatible by µP Control
- 8-bit µP Compatible Interface for Monitor and Control
- Subassembly Outputs: 8-bit Parallel Digital Bitstream with Synchronous Clock, Enable, Frame Start, Frame Error and Sync Status
- Power Supplies: +5V, +12V, +28V

ComStream
A Spar Company

Specifications

Electrical Characteristics

Input frequency Range	Min 950 MHz, Max 2050 MHz
Input Impedance	75 ohms
Symbol Rate	Min 0 Msps, Max 30 Msps
Channel Bit Rate*	Min 9.2 Mbps, Max 45.0 Mbps
Output Clock	CMOS Punctured/Gapped (Smoothed Clock Optional)
Output Data	CMOS 8-Bit Parallel
Monitor/Control Interface	CMOS µP Compatible
Descrambling (IESS-309)	2[15] Synchronous
FEC Decoding	DVB Viterbi/Reed Solomon (204,188)
Deinterleaving	Convolutional (Forney), I=12
Throughput Delay	2 msec
Acquisition Time From Channel Change [QPSK; QEF Threshold <500 MHz Step <100 KHz Offset]	100 msec
Power Requirement (typical)	
28 Volts	5 mA
12 Volts	300 mA
5 Volts	700 mA

* Other data rates, or variable rate options are available.

Environmental And Physical

Operating Temperature Range:	0° to 50° C, humidity 5% to 95% noncondensing
Storage Temperature Range:	-20° to 70° C, humidity 5% to 95% noncondensing
Atmospheric Pressure:	10,000 feet above mean sea level
Physical Dimensions:	11.5 cm x 14 cm x 3 cm (4.5" x 5.5" x 1.2") maximum
RF Input Connector:	F-type Female
TV IF Output Connector	RCA Type Female
Power/Control Connector	50 pin, dual in-line, bottom entry

Specifications subject to change without notice.

Headquarters: 10180 Barnes Canyon Road, San Diego, California 92121 Tel:(619)458-1800 Fax:(619)657-5404

COMSTREAM
A Gilat Company

Regional Offices

U.S./Canada: 10180 Barnes Canyon Road, San Diego, California 92121 Tel:(619)458-1800 Fax:(619)657-5404

Latin America: 10180 Barnes Canyon Road, San Diego, California 92121 Tel:(619)657-5416 Fax:(619)657-5415

Europe/Middle East/Africa: Ranger House, Walnut Tree Close, Guildford, Surrey GU1 4US UK Tel:(44)1483 440 933 Fax:(44)1483 440 876

China: China World Trade Tower, No.1 Jianguomenwai Ave. Ste 2309 Beijing, China 100004 Tel:(86)10 505 4824 Fax:(86)10 505-4842

Asia-Pacific: Wisma Budi, Jl. H.R. Rasuna Said, Kav C-6 Lantai 7, No. 702, Jakarta 12940, Indonesia Tel:(62) 21 521-3295 Fax:(62) 21 521-3343

© *ComStream, 1995. All rights reserved.*

Certification

I, Richard Leacock, am the person responsible for the preparation of the technical information and cost estimates contained in the foregoing letter. I certify that information is true and correct to the best of my knowledge. My experience in the field of tuners and decoders includes the development of the subscriber box for the DIRECTV system and the SPACEWAY system.

Richard Leacock
Systems Engineer
Commercial Systems Design
Hughes Communications Galaxy, Inc.

March 1, 1996